

REMARKS

The Office Action

Claims 1-34 and 62 are pending. Claims 1-9, 11-28, 34, and 62 are under consideration. Claims 1, 3, 11-13, 23, and 27-28 stand rejected for anticipation by Oswald (GB 1348045). Claims 2, 4-9, 14-22, 24-26, 34, and 62 stand rejected for obviousness over Oswald in view of Hubbell et al. (WO 00/44808; hereafter “Hubbell”).

Amendment to the Claims

Claim 1 has been amended to clarify the meaning of thiol precursor. While Applicants feel the amendment is unnecessary given the definition of “thiol precursor” in the specification, the amendment is made to emphasize the differences between the claimed invention and the prior art to advance the claims to issuance. The scope of the claim has not been changed by this amendment. Support for the amendment is found, for example, on pg. 6, ll. 17-23, pg. 21, ll. 1-6, and Figure 1. No new matter has been added.

Interview with the Examiner

Applicants thank the Examiner for the telephonic interview on January 30, 2006 and present herewith arguments commensurate with those discussed in the interview.

Rejections under 35 U.S.C. § 102

Claims 1, 3, 11-13, 23, and 27-28 stand rejected for anticipation by Oswald. In order to anticipate a claim, a reference must teach every element of the claim (M.P.E.P. § 2131). As previously argued, the instant claims are directed to methods and not compositions of matter, and in order for the cited references to be anticipatory, they must teach each step of the method recited in the claims. Oswald fails to do so.

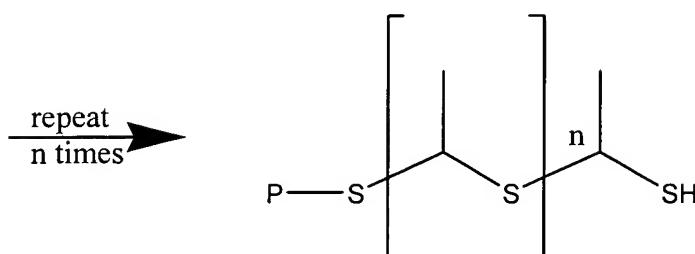
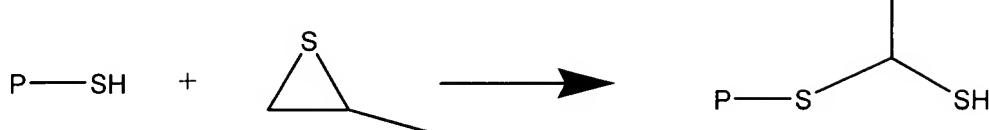
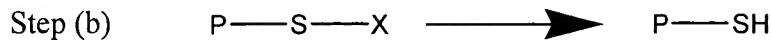
The Invention

Amended claim 1, from which claims 2-9, 11-28, 34 and 62 depend, recites:

A method of synthesizing a block copolymer, said method comprising the steps of:

- (a) providing a first compound comprising a polymeric thiol precursor comprising a thiol bound to a protecting group;
- (b) generating a polymeric thiol from said first compound by removing said protecting group; and
- (c) initiating a polymerization of a second compound comprising an episulfide group with said thiol produced in step (b) thereby producing a block copolymer comprising a terminal thiol. (Emphasis added)

A schematic depiction of the method is as follows¹:



With reference to this scheme, the method requires (a) the provision of a first compound including the polymeric thiol precursor including a thiol bound to a protecting group, i.e., P-S-X, wherein P is a polymer, S is the thiol sulfur, and X is the protecting group; (b) the generation of a polymeric thiol, i.e., P-SH from the first compound, by removing said protecting group; and (c) the initiation of polymerization of an episulfide, i.e., propylene episulfide in this scheme, by the polymeric thiol to produce a block copolymer having a terminal thiol. The polymerization is initiated by the polymeric thiol reacting with one episulfide, which results in the addition of one episulfide monomer to the polymeric thiol and the generation of a new thiol. This process is then repeated (n) times in order to

1 The scheme depicts the polymerization of propylene episulfide as a non-limiting example.

generate a block of polymerized episulfide bound to the polymeric thiol, i.e., the block copolymer.

Example 2 in the specification illustrates one embodiment of the claimed method. In this example, the thiol precursor is PEG thioacetate (PEG-S- C(O)CH₃), where PEG (poly(ethylene glycol)) is the polymer P in the above scheme, and the thioacetate is the thiol bound to the protecting group, where acetate (–C(O)CH₃) is the X in the above scheme (step a). The PEG thioacetate was then reacted with MeONa in order to generate the thiol (PEG-SH) by removing the protecting group (step b). The deprotected thiol was then reacted with propylene sulfide to produce the block copolymer (PEG-PPS) (step c).

Applicants emphasize that, while the term “precursor” in common usage may mean any raw starting material, the instant specification and the claim as amended attach a particular meaning to the term. The claim must be interpreted in light of Applicants’ definition, as required by M.P.E.P. § 2111.01. The specification defines “thiol precursor” as follows:

By a “thiol precursor” is meant any compound able to generate thiols as initiators for the *in situ* polymerization of episulfides. The thiol precursor may be thioesters, dithioesters, xanthates, dithiocarbamides, trithiocarbonates, or any compound, which, by nucleophilic attack, undergoes transesterification or transamidation reaction; a free thiol is generated and then deprotonated by a base, which can be the nucleophile itself or a non-nucleophilic compound, such as a tertiary amine (Fig. 1).... (pg. 6, ll. 17-23).

Furthermore, the amendments to claim 1 make it clear that the term “thiol precursor” includes a thiol bound to a protecting group. The use of a thiol precursor prevents the thiol from reacting until the appropriate point in a synthetic

strategy, e.g., when the episulfide is added. This ability enables the isolation, purification, and storage of the thiol precursor without the presence of undesirable reactions, e.g., disulfide bond formation. That is, the recited thiol precursor is not any raw material that can be used to make a thiol, but rather a compound already containing a thiol that is protected from oxidation and other unwanted side reactions.

Oswald

Previously, Applicants argued that Oswald failed to teach a thiol precursor, as defined in the specification, and therefore could not anticipate a claim that required the use of a thiol precursor. In rejecting these arguments, the Office states, “The term precursor can be any starting raw polymer. A polymeric thiol precursor can be any polymer having at least one thiol group.” This construction of the term ignores Applicants’ definition and is also moot in view of the amendment to claim 1.

Amended claim 1 recites “a polymeric thiol precursor *comprising a thiol bound to a protecting group*.” While Oswald does disclose methods of producing polythiols, as noted by the Office, these methods involve the reaction of H₂S, referred to as a monothiol, with polymers to obtain polythiols. For example, Oswald discloses the reaction of H₂S with thioolefin, polyolefin, triacryloyl triazine, triacryloyl ester, and triallylcarbinol. At no point in the reactions disclosed by Oswald, however, is a thiol bound to a protecting group formed. Thus, Oswald cannot teach the provision of the thiol

precursor, as instantly claimed. Furthermore, as Oswald fails to teach the limitations of claim 1, it is unnecessary to discuss the rejections of the dependent claims.

Rejections under 35 U.S.C. § 103

Claims 2, 4-9, 14-22, 24-26, 34, and 62 stand rejected for obviousness over Oswald and Hubbell. To support an obviousness rejection, the Office must put forth a *prima facie* case that meets the legal standard for obviousness found in M.P.E.P. § 2142.

This section states:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.

This standard has not been met in the present case. The combined references fail to teach or suggest the invention.

The Office relies on Oswald to teach the limitations of claim 1 and Hubbell to teach limitations of certain of the dependent claims. As stated above, Oswald does not teach the limitation of claim 1, and, thus, the rejection should be withdrawn.

Entry of the Amendment

The amendment to claim 1 should be entered under M.P.E.P. § 714.13 as it (A) places the case in condition for allowance by obviating all bases for rejection, (B) does not raise issues of new matter, as the amendment is fully supported on pg. 6, ll. 17-23, pg. 21, ll. 1-6, and Figure 1, (C) does not present new issues requiring further consideration or search as it is an amendment based on arguments made previously by the Applicant, and (D) does not increase the number of pending claims.

CONCLUSION

Applicants submit that the claims are in condition for allowance, and such action is respectfully requested. Enclosed is a petition for extending the period for reply for one month, to and including February 4, 2006. If there are any additional charges or any credits, please apply them to Deposit Account No. 03-2095.

Date: February 6, 2006

Respectfully submitted,

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